



SCEPTICAEMIC COLIFORMS IN BROILER CHICKENS ADMINISTERED EXTRACTS OF MANGO (*Mangifera indica*) AND NEEM (*Azadirachta indica*) BARK OBTAINED BY DIFFERENT METHODS

*A.A. AYOOLA, L.T. EGBEYALE, D. A. EKUNSEITAN and O. B. OLATUNBOSUN

Department of Animal Production and Health, Federal University of Agriculture

Abeokuta, Ogun State, Nigeria

E-mail: ayoolaaa@funaab.edu.ng, 08062299054

Abstract

Two hundred and eighty-eight-day old broiler chicks were used in a 56 days trial to investigate the effects of different methods of extraction of *Mangifera indica* (Mango) and *Azadirachta indica* (Neem) bark extracts on septicemic coliforms in broiler chickens. The birds were divided into two groups (144 each) and each group was sub divided into four (4) sub groups comprising of 36 birds replicated thrice with 12 birds each. Each sub group was either administered *Mangifera indica* or *Azadirachta indica* extract obtained from different extraction methods; maceration, infusion, decoction and control (antibiotics only). Extracts were administered in water at the rate of 150ml/litre without any antibiotics except the controls. Blood samples were collected at the 4th and 8th weeks to determine the total blood coliform count. Data collected were subjected to one-way Analysis of Variance in a 2 *4 factorial experimental layout. Results obtained showed that the two herbs had similar effects on the total blood coliform counts at starter and finisher phases. Total blood coliform count reduced with respect to different extraction methods as against control at the starter phase, however no significant difference ($P>0.05$) was observed at the finisher phase. It was concluded that both herbs had similar effects on septicemic coliforms. Different methods of extraction reduced coliform counts at starter phase, however, infusion method of extraction was more effective, hence recommended.

Keywords; *Azadirachta indica*, Coliforms, Extraction, *Mangifera indica* and Septicemic

Introduction

Coliform infections have been implicated as a major cause of morbidity, mortality, and condemnations in chickens and turkeys in recent years (Joe and Delbert, 2009). In bid to curtail this, antibiotics of different strain have been used which later resulted in the development of resistance in the bird against these allopathic medicines, with the accumulation of residues both in meat and eggs, which could pose threat to human health. Phytobiotics, being immunostimulant (Rangasamy and Kallipan, 2007) is considered one of the desirable alternatives, and if used wisely can reduce chemotherapeutic load in birds. The herbal remedies are cost effective, having minimum toxicity with reduced health hazards (Khandaker *et al.*, 2016). Several studies have reported antibacterial activities (Debashri and Tamals, 2012; Maragathavalli *et al.*, 2012) and antiviral properties of neem (Durrani *et al.*, 2008; Sadekar *et al.*, 1998). Mango has been reported to show moderate anti-microbial activity against Gram positive bacteria (Islam *et al.*, 2010). It has also recently been reported that the extract of *Mango* exerted antifungal activity (Kanwal *et al.*, 2010). The present study was therefore conducted to determine the effects of different methods of extraction of Mango (*Mangifera indica*) and Neem (*Azadirachta indica*) bark on septicemic coliforms in broiler production.

Materials and Methods

Experimental Site

The experiment was carried out at the Directorate of University Farms, (DUFARMS) of the Federal University of Agriculture, Abeokuta, South-west, Ogun State, Nigeria. The farm area lies within latitude 7°10'N. Longitude 3°2'E and Altitude 76mm above the sea level (Google Earth, 2017)

Source of Test Ingredients and Preparation

Fresh neem and mango bark were collected from Neem and mango tree within and outside the university premises. They were air dried until they became dried and cut into smaller pieces. Three methods of



extraction namely: Maceration, infusion and Decoction were used to get extracts from neem and mango bark.

Maceration: 100g of air-dried neem and mango bark were soaked inside 1 litre of water for 72 hours in a separate container after which the solution was filtered to obtain the aqueous extract.

Infusion: involves soaking 100g of neem and mango bark separately in 1 litre of hot water each for 12 hours to obtain the extract by filtration.

Decoction: this involves cooking 100g of neem and mango bark separately in 1 litre of water for two hours after which it was cooled before the extract was collected for use.

Experimental Birds, Design and Management

A total number of 288 commercial broiler day old chicks were obtained from a reputable hatchery. The experiment was arranged in a 2×4 factorial layout comprising of eight treatment groups. The birds were divided into two groups (144 each). Each group was sub divided into four (4) sub groups comprising of 36 birds replicated thrice with 12 birds each. Each sub group was either administered *Mangifera indica* or *Azadirachta indica* obtained from different extraction methods; maceration, infusion, decoction and control (antibiotics). The birds were brooded for two weeks. Birds administered either of the herbs were equally vaccinated and medicated except that no antibiotics was given but herbs. Herbs were supplied in their water for three consecutive days per week. Birds were fed *ad libitum* with commercial broiler starter (0-4weeks) and finisher (4-8weeks).

Data collection

Total Blood Coliform Count.

At the 28th day and 56th day, one bird from each replicate was selected and 3ml of blood was collected from them via the wing vein into a plain bottle. The blood samples were taken to the laboratory for determination of total bacteria count and coliform count according to Kinley (2009).

Statistical Analysis

Data collected were arranged in a 2×4 factorial layout and subjected to Analysis of Variance in a Completely Randomized Design using SAS (1999). Significant ($P<0.05$) differences among means were separated using Duncan Multiple Range Test as contained in the software

RESULTS

The effect of herbs and extraction methods of herbs on total blood coliform bacteria count in broiler chickens at starter and finisher phases is presented in Table 1. Coliform count was similar ($p>0.05$) between birds administered extract of *Mangifera indica* and *Azadirachta indica* at both starter and finisher phase. Extraction methods (maceration, infusion and decoction) of herbs reduced ($p<0.05$) coliform count at starter phase as against the control groups (antibiotics). However, coliform count was not affected by extraction methods at the finisher phase and the values ranged from (0.00 -267.50 cfu).

The result revealed that interaction of herbs and the different methods of extraction significantly ($p<0.05$) affected the total blood coliform count of the broiler birds at starter phase but had no effect ($P>0.05$) at the finisher phase. The control birds of the *Azadirachta indica* group had the highest coliform count (530.67cfu) while values were similar among other groups.

Table 1: Effect of herbs and different extraction methods on total blood coliform count in broiler chickens at starter and finisher phases

		Starter phase Coliform count(cfu)	Finisher phase Coliform count (cfu)
Herbs	Mango	125.67±36.13	260.63±98.53
	Neem	183.17±75.58	134.38±88.00
Extraction Methods	Control	357.33±88.04 ^a	258.75±149.42
	Maceration	144.67±95.12 ^b	263.75±152.28



Herbs * Extraction Methods	<i>Mangifera indica</i>	Infusion	27.67±26.10 ^b	0.00±0.00
		Decoction	88±41.37 ^b	267.5±154.56
		Control	184.00±92.53 ^b	255.00±255.00
		Maceration	104.00±96.11 ^b	527.50±2.50
	<i>Azadirachta indica</i>	Infusion	52.67±52.67 ^b	0.00±0.00
		Decoction	162.00±53.70 ^b	260.00±260.00
		Control	530.67±12.1 ^a	262.25±262.25
		Maceration	185.33±185.33 ^b	0.00±0.00
		Infusion	2.67±2.67 ^b	0.00±0.00
		Decoction	14.00±14.00 ^b	275.00±275.00

^{a,b} Means on the same column are significantly different (p<0.05)

DISCUSSION

In this study, reduced total coliform count by different extraction methods of herbs corroborate the study of (Cross *et al.*, 2007) who stated that some plant extracts exhibit antibacterial, antiviral and antioxidant properties. The antibacterial effect of neem in this study can be attributed to the presence of nimbidin, the main active antibacterial agent in the neem bark as reported by Biswas *et al.* (2002).

The antibacterial activity of mango in this present study is in accordance with Savikin *et al.* (2009) who demonstrated the antibacterial activity of mango extract upon gram-positive and gram-negative bacteria in his research which he attributed to the presence of tannin and mangiferin. The result of this study is also in agreement with Vega-Vega *et al.* (2013) who found the anti-bacterial ability of mango extract against *Salmonella* and *E. coli*.

In this study, infusion method of herb preparation or extraction was more effective, and this may be because large quantity of inert materials (ballast) that has no therapeutic value is extracted when maceration and decoction method were used (Azwanida, 2015).

Conclusion

It can be concluded that both herbs had similar effects on septicemic coliforms. Different methods of extraction reduced coliform counts at starter phase, however, infusion method of extraction was more effective.

Recommendation

Both herbs and any other of the extraction methods can be used to reduce coliform load in the blood of chicken especially at the starter phase.

References

- Agarry, O. O., Olaleye, M. T. and Bello-Micheal C. O. (2005). Comparative antimicrobial activities of Aloe vera gel and Leaf. *African Journal of Biotechnology*. 04(12): 1413-1414.
- Azwanida, N. N. (2015). A Review on the extraction methods used in medicinal plants, principle, strength and limitation. *Open Access Journal of Medicinal and Aromatic Plants*, 4:196
- Biswas, k., Chattopadhyay, I., Banerjee, R. K. and Bandyopadhy, U. (2002). Biological activities and medicinal properties of neem. *Current Science*. 82 (11): 1336-1345.
- Cross, D. E., Mcdevitt, R. M., Hillman, K. and Acamovic, T. (2007). The effect of herbs and their associated essential oils on performance, dietary digestibility and gut microflora in chickens from 7 to 28 days of age. *British Poultry Science*. 48:496-506
- Debashri, M. and Tamal, M. (2012). A Review on efficacy of *Azadirachta indica* A. Juss based bio pesticides: An Indian perspective. *Research Journal of Recent Sciences*. 1(3): 94–99.
- Durrani, F. R., Chand, M., Jan, A., Sultan, Z., Durrani and Akhtar, S. (2008). Immunomodulatory and growth promoting effect of neem (*Azadirachta indica*) leaves inclusion in broiler chicks. *Sarhad Journal of Agriculture*, 24(4): 665-659.
- Google Earth, 2017. Federal University Agriculture, Abeokuta 7°, 13'35, 48''N, 3° 25'39.01''E 3D Buildings Data layer viewed on October 2017 <<http://www.google.com/earth/index.html>>



- Islam, M., Mannan, M., Kabir, M., Islam, A. and Olival, K. (2010). Analgesic, anti-inflammatory and antimicrobial effects of ethanol extracts of mango leaves. *Journal of the Bangladesh Agricultural University*, 8(2): 239- 244.
- Joe, G. B. and Delbert, W. (2009). Bacterial Diseases of Poultry - Excluding Respiratory Diseases. Oklahoma Cooperative Extension Fact Sheets. *Journal of Pharmacognosy and Phytochemistry*, 5: 263- 269. (<http://osufacts.okstate.edu>)
- Khandaker, S., Das, S., Opo, F. A. D. M., Akhter, R. and Shahriar, M. (2016). In vivo Preparation of Plant Extracts from Indigenous Medicinal Plants. *International Journal of Science and Technology*, 1(12): 688-692.
- Kinley, B. (2009). Prevalence and biological control of *Salmonella* contamination in rendering plant environments and the finished rendered meals. Ph.D.thesis presented, Graduate School of Clemson University.
- Maragathavall, S., Brindha, S., Kaviyarasi, N. S., Annadurai, B. and Gangwar, S. K. (2012). Antimicrobial activity in leaf extract of neem (*Azadirachta indica* Linn.). *International Journal of Science and Nutrition*. 3: 110 13.
- Rangasamy, M. and K. Kaliappan. (2007). Panchagavya and andandrographis paniculata as alternatives to antibiotic growth promoters on haematological serum biochemical parameters and immune status of broilers. *Journal of Poultry Science*, 44: 198-204.
- Sadekar, R. D., Kolte, A. Y., Barmase, B. S. and Desai, V. F. (1998). Immuno potentiating effects of *Azadirachta indica* (Neem) dry leaves extract in broiler, naturally infected with IBD virus. *Indian Journal of Experimental Biology*. 36(11): 1151-1153.
- SAS.(1999). SAS/STAT User Guide (Released 6.08) SAS institute inc. Cary, North Caroline, USA
- Savikin, K., Menkovic, N., Zdunic G., Stevic T., Radanovic D. Jankovic T. (2009). Antimicrobial activity of *Gentiana lutea* L.extracts. *Journal for Nature Research* 64: 339-342.
- Vega-Vega V, Silva-Espinoza. B. A., Cruz Valenzuela M. R., Bernal-Mercado A. T., Gonzalez Aguilar G. A. and Ruiz-Cruz S. (2013). Antimicrobial and antioxidant properties of by product extracts of mango fruit. *Journal of Applied Botany and Food Quality*, 86: 205-211.